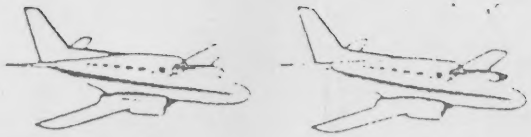
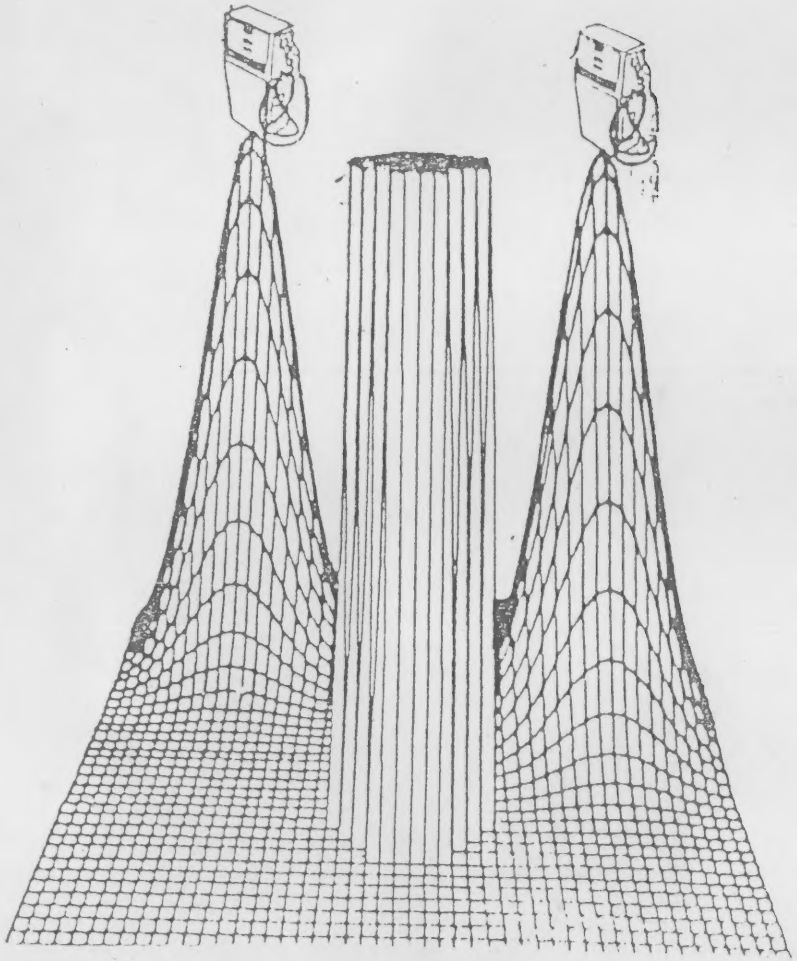


PROGRAMMERS SOFTWARE

2110 N 2nd St

CABOT AR 72023



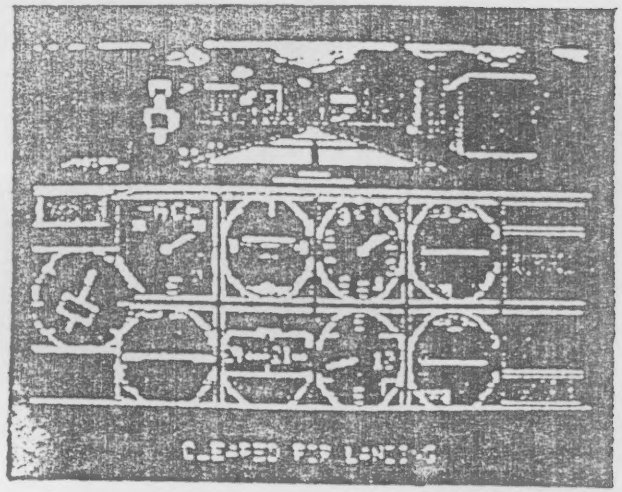
IFR SIM DON'T NEED GAS

E 4B

PROGRAMMERS FLIGHT SYSTEM
APPLE II PLUS 48K DOS 3.3

IFR SIMULATOR

1/25



TELAHIN ENTERPRISES PTE LTD

AIRPLANE INSTRUMENTS

1. Open disk door

2. take out old disk, if there, put IFR disk in drive.

3. Close door of disk drive.

4. Turn on power to Apple II Plus and wait a few seconds.

5. If a MENU doesn't appear, push reset. (this simply means that you don't have an autostart system installed)

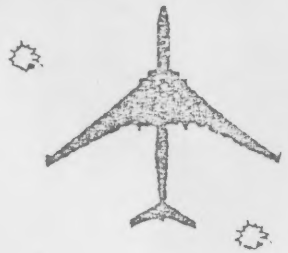
If you have a menu, go on to select the problem to fly.

6. Push the number key on your Apple that coresponds to the slot number your disk drive is plugged into. For example, if you're using slot No. 6 push the 6 key.

7. Hold down the control key and push the P key.

8. Push the Return key.

9. Your Apple should boot up and the MENU should appear on the screen.

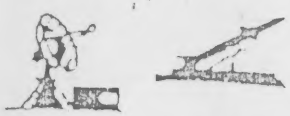


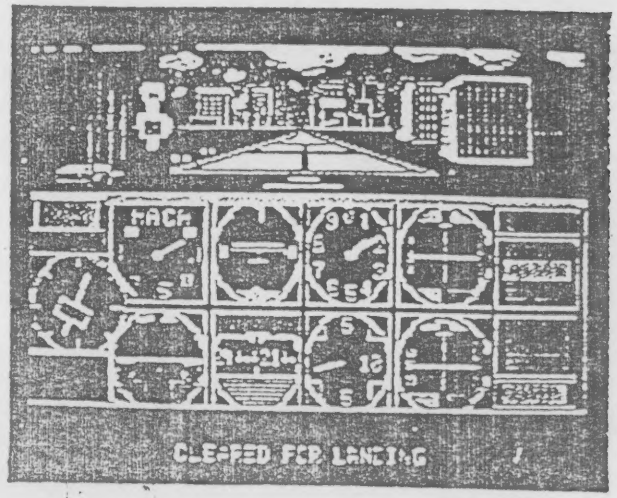
Banks to the left or right are controlled by the game paddles. Nose up and nose down attitude is controlled by the game paddles also. Push the P key to add power. Return is not necessary, power will increase about 3% each time the P key is pushed. Push the L key to reduce power. Return is not necessary. Power will decrease about 3% each time you push the L key.

Push the esc key for a peek at the X Y plot. This is cheating of course, so the computer will punish you by blanking your compass for a while when you return to flight. Push the esc key again to get the instruments back.

When your simulator's altitude gets below a certain vlue, usually the MDA of the problem you're flying, the mode will automatically switch to X Y Plot and will show you the airport approach plate and the path you flew to get there. If you flew the approach correctly you will be in a position to land when you get there.

If you flew the approach successfully, you will be in position to land on the runway you chose.





IFR SIMULATOR
1982 Version

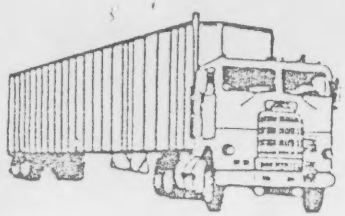
This program requires an Apple II Plus with at least 48K and DOS 3.3. Boot from the IFR Simulator disk. The boot subroutine contains machine code used by the Applesoft Basic programs. These subroutines will be present only when booted from the disk supplied with your program. After booting, you may run any SIM program, even one from a non SIM disk.

When your Apple boots, you should see a MENU on the screen. The MENU allows you to select one of several problems to fly. These are set up as approaches to landing with a certain pattern in mind for each. You may, however fly any pattern you wish. For example, you may fly holding patterns prior to your approach and etc. The only system restraint is that the mode will switch from flight instruments to an approach plate and plot your X Y progress any time your altitude becomes less than a minimum selected for each airport. The minimum is roughly the MDA.

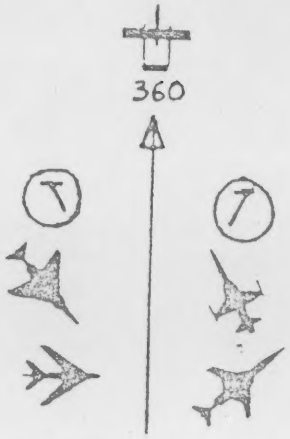
The MENU contains an entry labeled (S) and (V). This is provided so that you may save the X Y Plot picture if you do one that you would like to review later. The S is for Save and the V is for View. If you

want to save several ; res, it is advisable to use : ther disk so that you don't ceed the storage capacity . your IFR SIM disk.

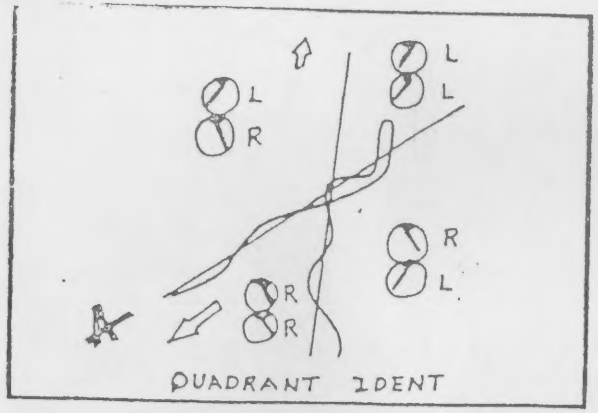
To view a picture saved on another disk, insert the other disk when the prompt for the filename appears.



Omni doesn't care about the direction of flight. It only shows which side of a line the airplane is on.



LITTLE ROCK



EACH QUADRANT CAN BE IDENTIFIED
BY A UNIQUE SET OF OMNI INDICATIONS

OMNI INTERSECTIONS

Most SIM problems involve the intersection of two omni radials. It will help the beginner to visualize your position on the map by drawing two lines.
Approximate the headings in the problem with the lines and make them intersect some where near the center of the page. You will have created four quadrants when you do this. Each quadrant will have a unique OMNI that you can note by drawing two circles in each with needles inside corresponding to the OMNI needle deflection. When you fly the problem, identify the quadrant by the omni indications on the simulator and fly a heading that will take you toward the intersection. Once at the intersection, you can continue the approach from a known position.

See!! Duck Soup ain't it.

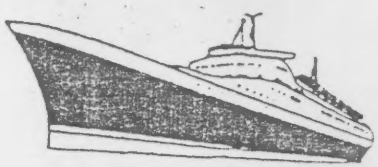
You can get a Custom program of an Airport of your choice from your Local Computer Store. We write the program, He gets his normal Dealer Discount.

$100.00 your price.

THE APPROACH PROBLEMS

These basically involve getting from a place where you start to a point from which you can make a good landing. This point, known to pilots as the "Final Approach Fix" can be arrived at in the simulator by flying the clearance given at the beginning of each problem. Always write the headings you are to fly on a scratch pad so you won't forget them during the flight. Fly the headings given and you will arrive at the approach fix.

As an example, lets take the Little Rock ILS approach to runway 22. The clearance tells you to fly heading 270 and intercept the Omni, then fly 004 along the Omni radial to intercept the Localizer, then fly the localizer to the runway. We know that the heading for runway 22 will be 220 degrees and so our final heading will be near 220 depending upon the random wind.



If you haven't been flying the OMNI range much, you will likely become hopelessly lost in just a few seconds. The following is a short guide that might help.

Note that in an intersection of two OMNI radials, there will always be four quadrants formed. In any one of these quadrants, there will be one and only one pair of needle deflection indications that fit. For example, in the Little Rock approach problem, the intersection of radials 004 and 220 form four quadrants. The bottom OMNI is set to the 004 degree radial and the top OMNI is set to the localizer, which is 220 degrees. In this case the top OMNI will deflect to the right and the bottom OMNI will deflect to the left anywhere in the lower right quadrant. The lower left quadrant may be identified by the top OMNI indicating right deflection and the bottom OMNI indicating right deflection. The upper left by top OMNI left and bottom OMNI right, etc.

To fly the problem, simply use the OMNI indications to identify the quadrant you're in and choose a heading that will take you toward the intersection. When you intercept one of the radials, fly the heading of the radial to the intersection and make the approach.

YOUR COMPUTER DEALER can arrange for us to write a special program for you that will simulate any approach to any airport. You provide the dealer with an approach plate, either a published one or even one you make up yourself, and we will do the rest. We charge $100.00 retail for this service and send the program to the dealer. He gets his normal dealers discount, so give him your business, he will love it.

On your disk is a program called SEED. This program is what we use to make new IFR problems. We charge $100.00 for this custom programming, but if you are capable, you can do it for yourself. It is not easy, and if you haven't done much programming, you will spend more than $100.00 worth of your own time doing it, but if you must try, the following is how we do it.

Get the MENU on the screen, push X and return to get in the Applesoft Command mode. You should see the Applesoft prompt. Type LIST 0,500 and return.

Look at statement 470. XC and YC are the location of the OMNI Intersection. XF and YF is the NDB location on the screen. Set these to the desired OMNI Radial Intersection and the location of the NDB on the problem you're writing.

List statement 570. This sets up the amount of time you have to complete the problem. It is set to 15 minutes and this is probably as long as you will need. If you want it shorter simply change the 15 to whatever you want.

Statements 770 through 1170 set up a random wind for the problem. In the seed program, the wind will vary from any of the four directions and be from zero to fifty knots. Statement 820 may be changed to select another amount.

The starting X Y location of the airplane is controlled by statement 1520. Statement 1470 should be changed to provide a message at the bottom of the screen. We usually print the OMNI message here. Which Omni is tuned to what etc.

Statement 1720 sets up the starting altitude. The Little Hand is AL the big hand is AL-3. MA% is the MDA at which the mode will change to show the map.

Now look at statemen: :720. This is where the left to right movement of he OMNI indicators is calculated. By this time in your program you will have plotted your planned problem on graph paper so that you will know the correct flight path. If you need help look at this statement in some of the other programs on your disk. X and Y are the airplanes position on the map. (screen) DX and DY are the deviations for the OMNI needles. Numbers larger than +6 and numbers smaller than -6 are discarded and changed to the Max deviation later in the program.

Statement 4370 sets up the glide slope. Statement 4870 moves the picture of the airport into place.

Statement 5030 through statement 5240 is used to draw the map. This is just plain Applesoft HIRES graphics. Use these statements to draw the airport map and the flight path along the omni airways.

Statements 5580 through 5620 print the clearance message at the beginning of the program. This should contain enough information to complete the problem. This information is the omni station ID and flight path bearing selection for each OMNI and a heading to fly that will get you on the first leg of your program model.

We think your time is worth at least $20.00 per hour. Keep this in mind while you do the program. I bet the $100.00 we charge is a bargain.

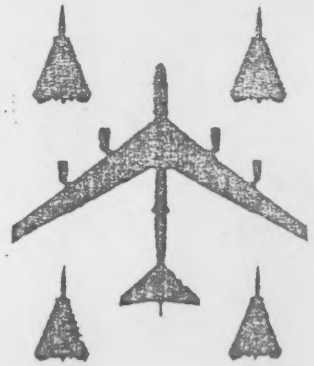
NON PILOT SECTION

If you are not a pilot, the IFR Simulator will seem very difficult to you at first. It is in fact, very difficult to fly an airplane from place to place, make landings and take offs, fly exact headings and altitudes and at the same time keep the sky above and the ground below with only instruments for referance.

IFR Pilots are required, however, to master this skill before they are allowed to fly in conditions where clouds or other obstructions to vision might cause poor visability. The IFR Simulator features the set of instruments used by pilots in those conditions. The instruments function and are grouped together on the panel the same as those of a real airplane. IFR Pilots usually spend 40 or more hours practicing IFR flight at airports where the cost will be $35.00 to $55.00 depending upon the equipment, before they are allowed to fly IFR alone. They must also pass a rigerous test to prove their skills. The problems of these tests can be simulated on the IFR Simulator. IFR SIM is in fact, a little more difficult to fly than a real airplane.

The first step is to stablized the airplane in straight and level flight. To do this, center the game controls before flight and get the Horizon stablized as soon as you begin flying. This is the instrument in the top row with a bar that moves in a circle. It is just right of the airspeed indicator and just left of the altimeter. To visualize the Horizon pretend you are looking through a hole in the instrument panel and the white bar that moves is the horizon of the earth. When you bank to the right, th earths horizon tilts to the left When you climb, the earth horizon is seen lower through the hole etc. It will seem backward to you at first, this is natural, even pilots of long standing have to over come this. If you think of the instrument as a hole through which you view the earth's horizon, you will soon be able to hold it steady.

After you get the horizon pinned down, get the airspeed within the operating range Remember, the P and L K and the nose down and no up conditions control it.



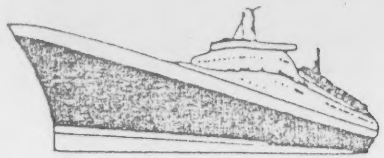
PLEASE KEEP THIS IN MIND AS YOU READ THIS BOOKLET

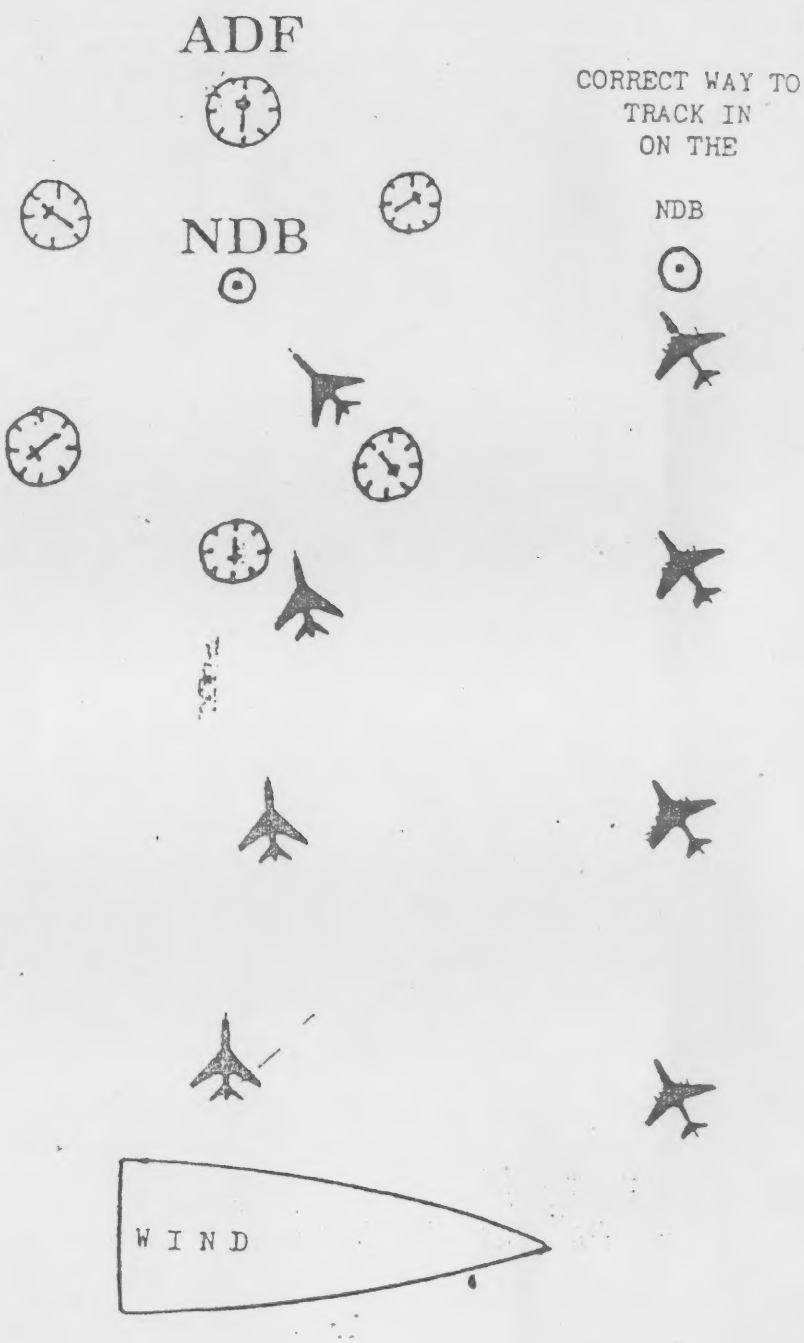
This is not a course in IFR flying. It is rather a tool that can be used by one to better understand the workings of airplane instruments and instrument navigation as it is done in the United States. It may be used in conjunctin with any of the fine IFR courses available from your local airport. These typically cost between $35.00 and $150.00. If you have been thinking about IFR flying you probably already have one.

AUTOMATIC DIRECTION FINDER AND NON DIRECTIONAL BEACON

The old Non Directional Beacon or NDB as it is called has been around for a long time. It was first used with a loop antenna and it was necessary to rotate the antenna and listen for a null in the beacon to find the direction to the radio. This has been improved now so that a needle in the airplane automatically points toward the radio. This device, the one that turns the needle, is called an Automatic Direction Finder or ADF. The radio receiver portion of an ADF will usually tune the low freq. band and the Broadcast portion of the commercial radio bands. In use, it is simply a needle that points to the radio station to which it is tuned. The fun begins when you start to consider what happens to your track across the ground when the wind blows. If you keep the needle dead ahead, you will fly a circular path to the NDB.

In order to fly directly to the station in a straight line you must crab into the wind. Just exactly how much is where the skill comes in. There are many methods outlined in IFR instruction booklets. We have provided in the Simulator an ADF indicator that behaves like a real one so that you can practice these skills. There is also Wind in the problems that varies from zero to about 50 MPH.





HOW TO SELECT A PROBLEM TO FLY

1. Look at the list of problems and choose one by pushing the key that corresponds to the number or letter in the brackets. Do not push Return. The computer will load a program from the disk.

2. A "Clearance" will appear on the screen. This contains the information you will need to fly the problem. You may use published government approach plates and maps as needed or the sketches provided in the booklet. Make a note of the headings and the sequence in which they are to be flown. If you fly them, they will take you to the airport.

3. Center the game controls to avoid a wild ride in the beginning.

4. Push any key and you will be flying.

5. Get control of your Attitude and turn until the compass has a full set of numbers on its dial.

6. Fly the problem you selected. Note that any time your altitude becomes less than the MDA the flight will end and a map showing your flight path will appear on the screen.

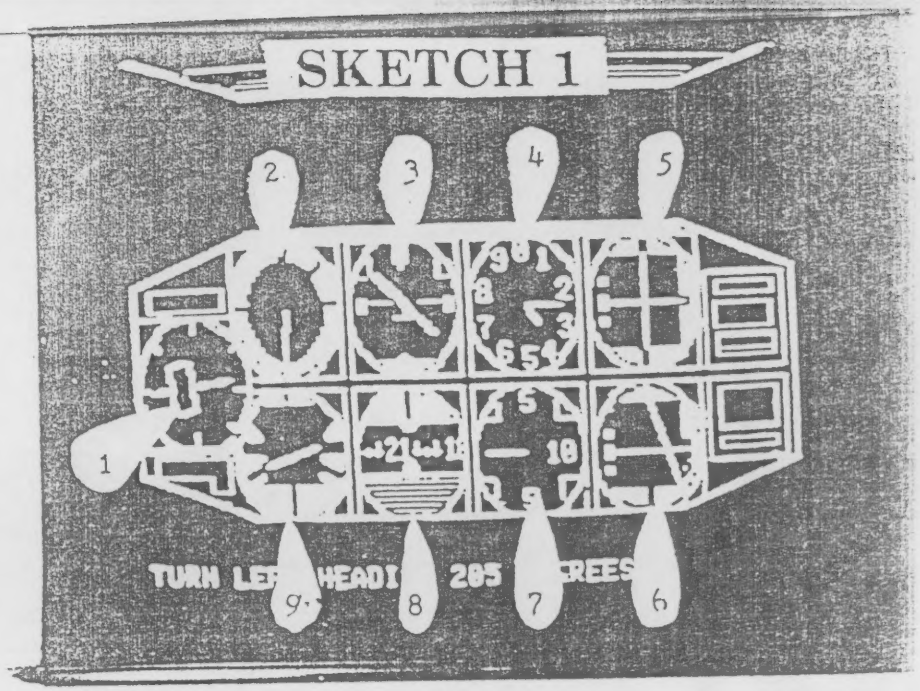
7. The object of this whole thing is to produce a picture showing your flight path. If successful, the path will lead from your starting point and logically progress toward an ending point from which you would, without a doubt, be able to land on the chosen runway of the chosen airport.

8. If you like the results and want to save the picture, push any key other than the Return key. The Return key will allow you to fly the same problem again.

9. When the MENU comes back, push the S key to save your picture. When the computer asks for your initials type them in and the computer will create a binary file of your picture of that name. You may view the picture later by using the V key.

TO SAVE YOUR PICTURE ON ANOTHER DISK

Remove the IFR disk and put the other disk in when the prompt, "what is your name" appears on the screen.



KNOW THE INSTRUMENTS BEFORE ATTEMPTING TO FLY

The numbers in the outline below correspond to the numbered position of the instruments in SKETCH 1

1. Automatic direction finder, known as ADF indicator. This always points to the radio station to which it is tuned.

2. Airspeed indicator shows the speed of the airplane through the air. The white portion on the simulator is the

STALL area and should be avoided in flight.

3. Horizon indicator. Think of it as a hole through which you observe the horizon of the earth. It may seem to move backward at first, but it works the same as it's counterpart on a real airplane. It seemed backward in the simulator because you remain still the earth moves about.

4. The altimeter measure your height above sea level The long needle is thousa of feet and the short on hundreds feet.

5. OMNI No. 1 indicator your left or right devia from a selected radial front to an Omni radio station

OMNI No. 1 but will usual be set up to a different radial and a different Omni radio station.

7. The Rate of Climb indicator shows whether the airplane is climbing or decending. It typically lags behind the Horizon indicator by a few seconds.

8. The Compass indicator. We have tried many variations here to find a suitable display. Although we get companints about the old fashoned style ew finally adopted, it is the best of those we tried. It looks and works like the primary compass found on all airplanes. Most people would prefer the new placard type found on DG indicators. The graphics to do a good job on the placard was not quite available to us.

9. The Rate of Turn indicator shows the turn rate of the airplane. It moves with the airplane and banks to the right when the airplane banks to the right. It seems better to fly than the horizon, but watch out. It lags behind the horizon and so can get you in trouble if you're not careful.

Continued on page 15

The following are among the programs included.

(1) LAX ILS 24L
270 till top Omni cntrs.
330 till Bot Omni cntrs.
240 to runway.

(2) LAX NDB 24L
090 till Bot Omni cntrs.
060 till top omni cntrs.
Direct to NDB
249 to runway

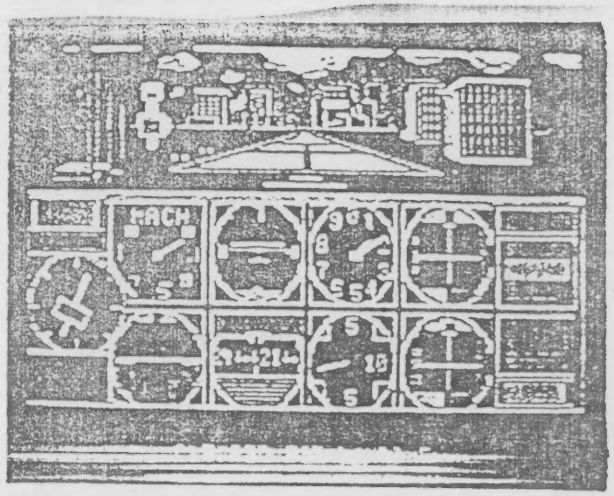
(3) LR ILS RWY 22
330 til Bot Omni cntrs.
004 till top Omni cntrs.
220 to runway.

(4) LR NDB RWY 4
Direct to NDB
220 Out Procedure trn.
042 in to RWY

(5) LR NDB RWY 22
270 till Top Omni cntrs.
180 till NDB is 220 off
042 outbound Procedure
220 inbound to runway

(6) STUTGART NDB
Direct to NDB
344 Out Procedure trn.
164 inbound to runway.
FAF is Bottom OMNI

(7) Conway NDB
Direct to NDB
090 Out Procedure trn
270 Inbound to Runway
Beacon is on airport.



After you have mastered this enough so you don't crash and burn every time, you may want to try holding a heading. Pick out a number on the compass and try to hold it using the game controls to turn the airplane to the desired heading. Remember, in actual flight, the numbers stay still and the airplane rotates around them. It seems backward in a simulator and also in a real airplane when you cant see the ground or something that moves relative to the airplane. You have to force yourself to believe the instruments. When you can hold a heading, try flying a square box pattern using the esc key to view you progress from time to time. After the square box pattern, you may want to try an approach problem.

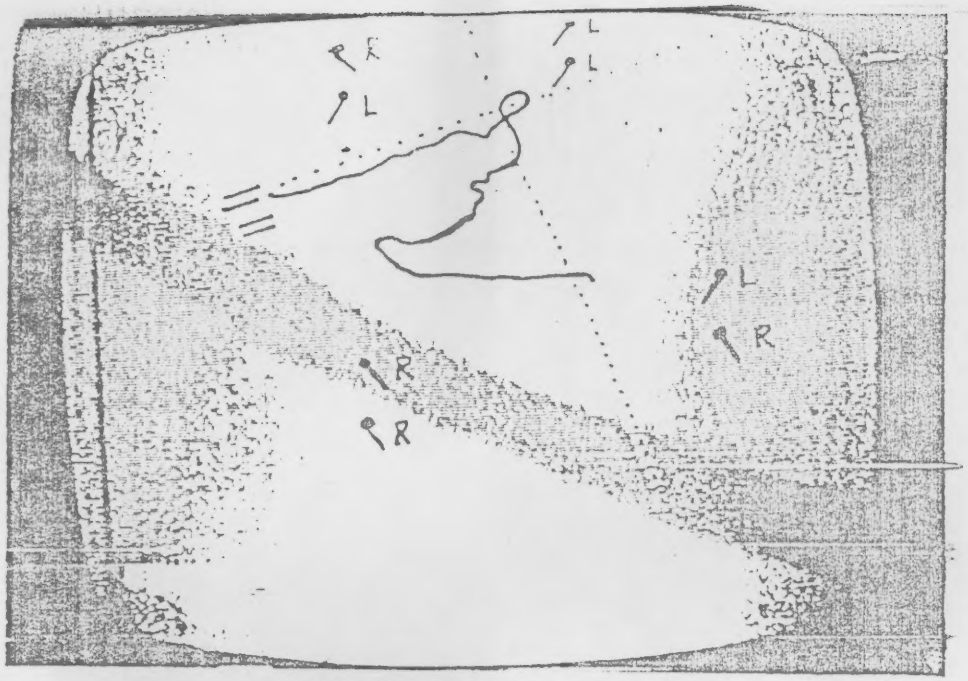
(8) PALWAUKEE ILS RWY 16
120 Till Bot Omni cntrs.
060 till Top OMNI cntrs.
160 to runway

(9) LOST IN LA
Top OMNI is 330 FM SL BCH
Bot OMNI is ILS 24L LAX
ADF is Romin
Good Luck

(A) LOST IN CHICAGO
Top Omni is PWK ILS 16
Bot Omni is 065 to OBK
ADF is WGN radio
Good Luck

(B) LOST IN LR
Bot OMNI is 004 From LIT
Top OMNI is ILS RWY 22
ADF is Laski
Good Luck

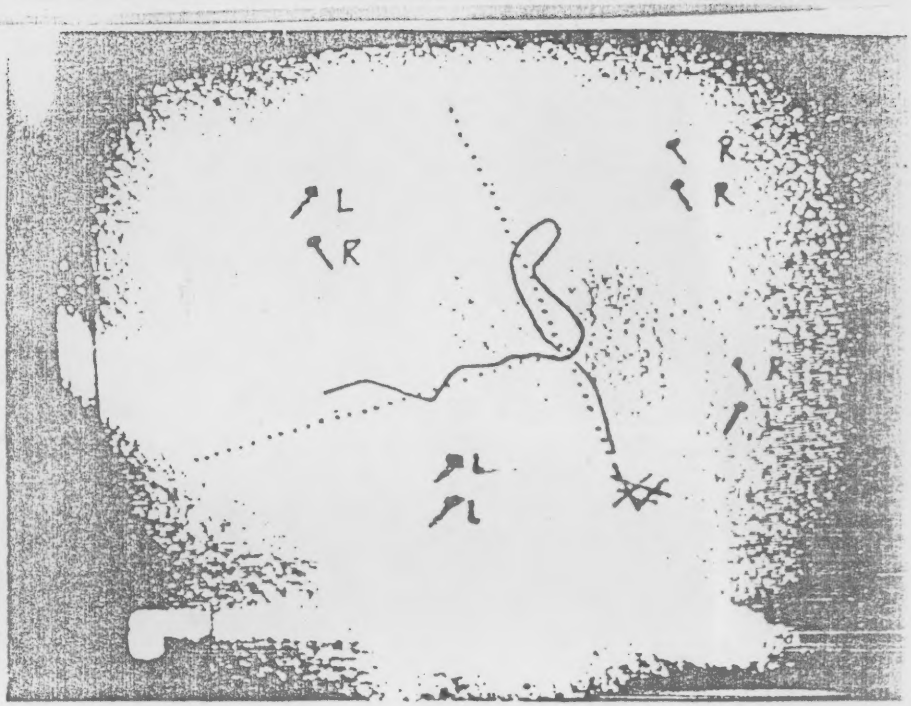
Continued on page 21



LOS ANGELES

LOS ANGELES INTERNATIONAL ILS 24L
The Top Omni is tuned to the Seal Beach VOR and set to Radial 330. The problem is set up for you to fly heading 270 degrees, intercept the Seal Beach VOR Radial 330, fly that to the Merce intersection, hold east for one turn, then follow the localizer with a heading of about 240 degrees straight into Runway 24 Left. The ADF is the Final Approach Fix.

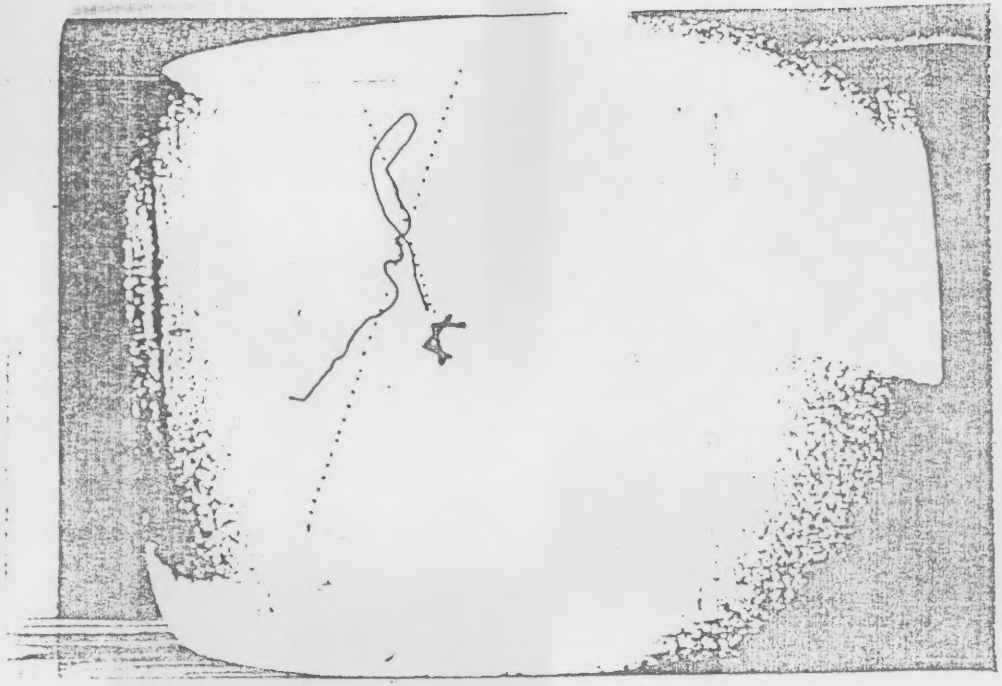
LOST IN LA. The easyest way, of course, is simply to track the ADF inbound to the NDB and make an ILS approach from there. You can also do it with OMNI alone by the four quadrant method.



PALWAUKEE

Palwaukee Illinois Approach PWK LLS RWY 16
This problem is easily flown if you follow the instructions in the clearance. Fly 120 degrees to intercept the BOTTOM Omni. Then track it 065 degrees to intercept the LOC (TOP OMNI). Fly outbound on the localizer for one minute, make a procedure turn to the east, and then track the localizer in to make the landing. The BOTTOM Omni will center at the Final Approach Fix.

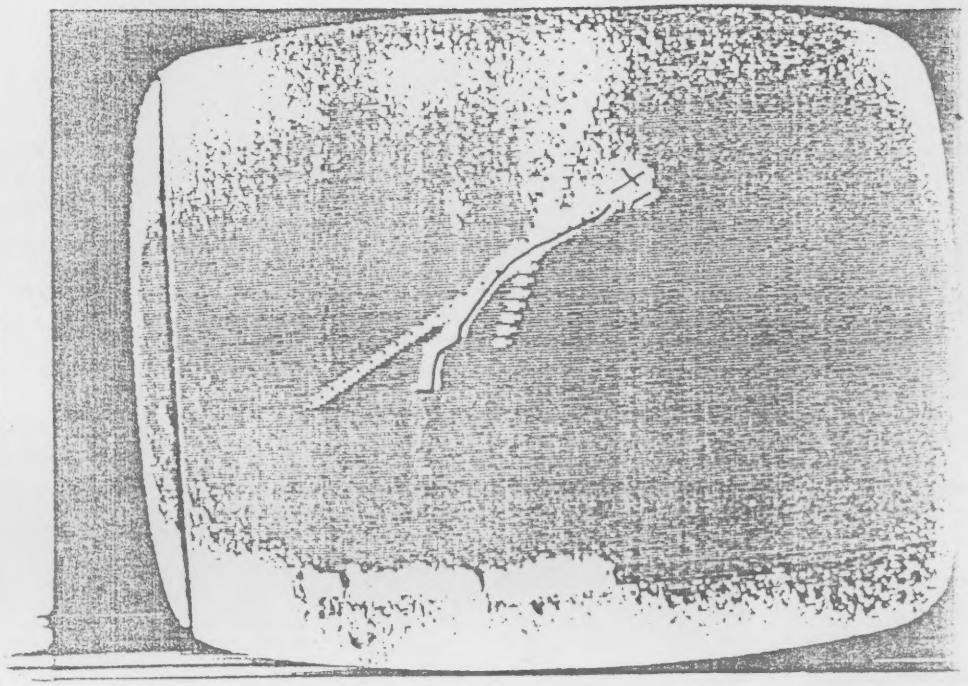
LOST IN CHICAGO? Remember the four quadrants. Draw yourself a picture. Bottom Left will be Top L, Bot L. Bottom Right will be, Top R, Bot L. Top Left will be Top L, Bot R. Top Right will be Top R, Bot R. So easy isn't it.



STUTGART MUNI NDB RWY 18
DUCK HUNTING CAPITOL OF THE WORLD

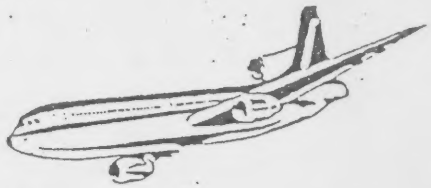
The NDB is the Leftmost instrument on your Simulator. It always points directly to the Radio Station which is located at the intersection of the two dotted lines in the Picture. The flight path flown in the picture was from the Stutgart Approach plate NDB RWY 18 published by the FAA.

NDB approaches are both the easiest and the most difficult of all the approaches. They are easiest to fly you can always get there by flying to the beacon and then fly a heading toward the airport. They are the most difficult to fly well. The unskilled will miss the runway by a mile or two. Happy Landing at Stutgart.



DAYTONA

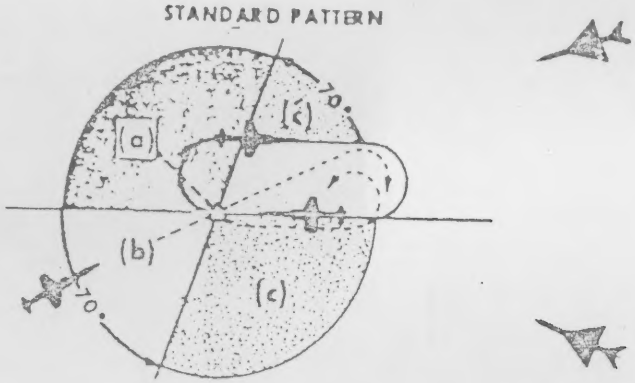
The Simulator Approach for Daytona is set up as a straight in, right down the Localizer beam. The easiest way is to take up a heading that will get you directly to the localizer. If your localizer (top Omni) is showing a left indication fly 360 degrees, if it is showing right indication, fly 180 degrees. Fly the localizer about 060 degrees + or - the wind crab angle you may need. The Bottom Omni should center at your Final Approach Fix. Happy Landing



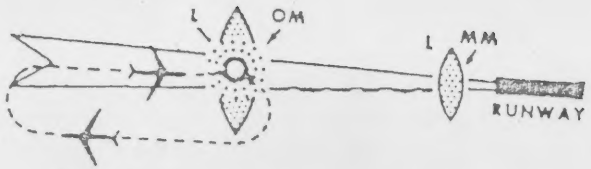
...N CAN BE USED TO PRACTICE

HOLDING PATTERNS

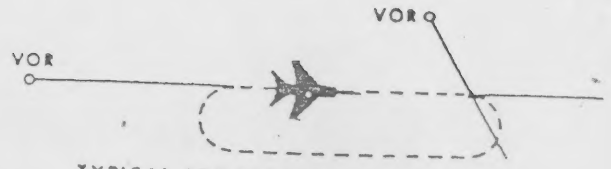
When it is necessary to wait a while when you are tooling along in an airplane, you can't just pull up and stop. To overcome this problem the FAA over the years has worked out a set of rules to allow an airplane to hold at various points that can be identified by equipment aboard the airplane. Actually, any point that can be identified can be used as a holding fix. These are typically intersections of two Omni radials, a radio beacon, a DME position along a radial etc.



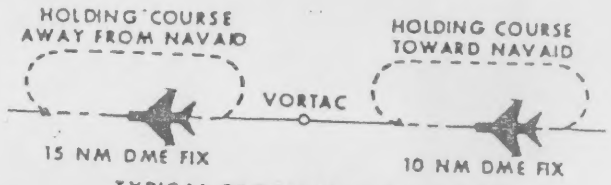
EXAMPLES OF HOLDING



TYPICAL PROCEDURE AT AN ILS OUTER MARKER SITE



TYPICAL PROCEDURE AT INTERSECTION OF VOR RADIALS



TYPICAL PROCEDURE AT DME FIX

Note that these neat patterns are the same size at each end. In actual flight and also in the Simulator this will seldom be the case. The wind will cause one end or the other to be stretched and the other shortened. This is normal, the challange is to make multiple trips around the pattern and fly the same path each time.

If you really want to get into holding pattern flying, there is some very good detailed information in the Airmans Information Manual. You can pick up a copy at your Local Airport or by writing Aero Publishers, INC at 329 West Aviation Road, Fallbrook, CA 92028

Continued from page 15

(C) Daytona ILS
090 till Top Omni cntrs
065 to runway
FAF is Bot OMNI & ADF

(D) Daytona NDB
Direct to NDB
245 Out Procedure trn
065 Inbound to runway
Omni is 190 from OBK

! NEED HELP !
NOTICE

IFR simulator is relatively stable in pitch and roll when flown as intended. If you have problems maintaining a heading you are probably attemping to fly inverted. IFR SIM does unpredictable things when inverted. It may even seem to fly normally for a while and then become very unstable.

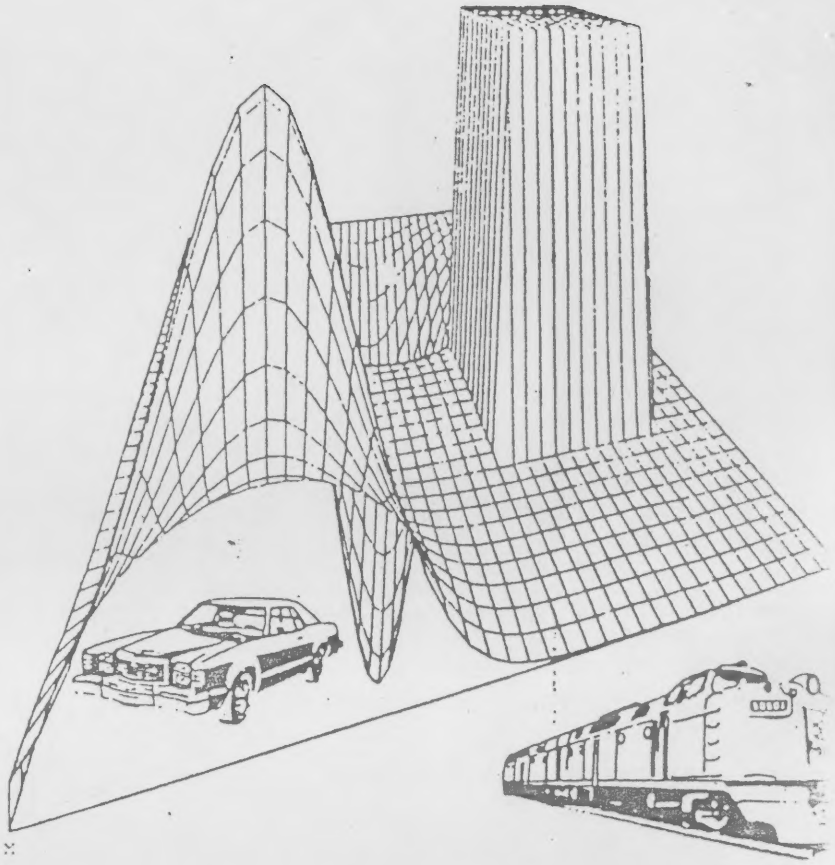
IF IN DOUBT roll 180° while looking at the horizon indicator (2nd from top left) and try it.

SIM always Boots flying normally!

WHY NOT LET US CUSTOM PROGRAM A PROBLEM FOR YOU

Choose any airport, even your own privite field and give us a sketch of the approach plate. It may be a published government plate or even one you make up yourself. It may be any type of approach you desire as long as you can sketch it out so that we can understand what you want. You may specify any wording you wish to appear on the screen in place of the clearance when the program starts. Advertise your own FBO operation etc. We will do this for $100.00 cash check MO Visa or Mastercard. Send us the material and we'll have the program back to you in about a week.

Programmers
Software



IFR SIMULATOR is the direct result of the ability to do graphics with small personal computers such as the Apple II. It is by no means the state of the art. It is simply the best we could do with the amount of time we had to work at it. If the demand for this program continues then we will continue to improve it and eventually it will be as good as any commercial IFR simulator that is within the price reach of the average pilot.

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